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ABSTRACT

The National Association of Secondary School Principals (NASSP) identified 34 high schools whose students maintained or improved their SAT scores from 1973 to 1976 or whose mean scores in 1973 were approximately the same as in 1965. In an open-ended questionnaire, the principals of these schools were asked to identify success factors. Their responses were placed under seven headings: (1) academic rigor; (2) English curriculum; (3) mathematics curriculum; (4) guidance programs; (5) grouping and grade weighting; (6) teacher attitudes and expectations; (7) parental and student attitudes and expectations. The schools attributed their success not to any one course or technique, but rather to a singular commitment to academic achievement for college-bound students--the belief that these students should face a moderately stiff curriculum, be counseled as to its value, be supported by parents and teachers in its attainment, and be tested on its outcomes. Data from the NASSP questionnaire and a related study by Gary Echternacht of Educational Testing Service suggested practical guidelines for English, mathematics, ability grouping, counseling programs, test preparation, students, parents, and professional staff. The Appendix includes a list of the 34 schools and a position statement for college mathematics preparation. (CP)

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Guidelines for Improving SAT Scores

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Guidelines for Improving SAT Scores

National Association of Secondary School Principals
Reston, Virginia

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Foreword

FOR MANY YEARS THE NASSP has collaborated with the College Entrance Examination Board on a number of important projects affecting the nation's secondary schools and colleges. Most recently the Association assisted CEEB in its comprehensive study of SAT score declines. When the Advisory Panel's report was released, every major paper in the country carried it as front page news.

The interest of professionals matched that of laymen and panaceas by the dozen were suggested to correct the sliding verbal and mathematics scores. Cries were heard throughout the land for a return to the basics, and competency examinations were tied to the reception of the high school diploma in 32 states. Undoubtedly all states will move to some type of proficiency or performance standard within the next 12 months.

In the news stories and editorials which followed the release of the College Board report, one important fact became conspicuous by its absence; i.e., the scores in some of our high schools did not decline. Some in fact improved their scores.

The "Why" question was immediately addressed by NASSP's research unit under the aegis of Deputy Executive Director Scott Thomson. The guidelines presented in this monograph tell the story of several successful schools and we commend their apparent solutions to all readers for full and serious review.

Owen B. Kiernan
Executive Director
NASSP

Introduction

IN THE FLURRY OF COMMENT about the 14-year decline in scores on the Scholastic Aptitude Test, one important factor has been overlooked. The scores in some high schools have not declined. In fact, a few schools have slightly better average SAT scores today than in 1973, and equally as good as their average scores in 1966.

One of the 27 research reports prepared for the College Board's Advisory Panel on Scholastic Aptitude Test Score Decline identified schools with stable or slightly rising SAT scores. The report also identified schools whose scores had fallen significantly faster than the national median decline. Data on the two groups of schools were gathered for comparative study and analysis by Gary Echternacht of Educational Testing Service.[1]

The drop in test scores for the low group had been dramatic, an average of about 100 points on the verbal test and 90 points on the mathematical test. Both groups of schools in 1966 had enjoyed nearly identical score averages of 475 in the verbal test and 490 in the mathematical test.

The Advisory Panel quite correctly insisted in its final report, *On Further Examination*, that schools alone could not accurately be blamed for the test score decline. Rather, a constellation of social factors—family breakdown, television, new lifestyles, political turbulence, desegregation, and a changing student composition—could all be assumed as contributing causes of the decline. Yet school is the place where students spend 175 to 180 days a year, and presumably changes in the educational environment as well as in student attitude and effort could fairly be assumed to have affected the direction of SAT scores.

The ETS questionnaire to the improved or stable-scoring and to the low-scoring schools examined certain factors, including curriculum, teacher preparation and attitude, student behavior, and institutional policies (i.e., grading, tracking, discipline, etc.). The

1. Gary J. Echternacht, *A Comparative Study of Secondary Schools with Different Score Patterns* (Princeton, N.J.: College Entrance Examination Board, 1977).

survey, however, did not examine a number of other broad conditions that could affect test scores. For instance counseling programs, graduation course requirements, course content, course objectives, parent attitudes, testing readiness (prepping), testing conditions, and faculty inservice programs were not included.

Some keys to a better understanding of the test score situation are likely to be found in these broad factors of school life, again recognizing that schools can only report their part of the total story of the decline. Consequently, NASSP identified 34 high schools with stable or rising SAT scores and requested the principals of these schools to give their professional opinions as to the reasons their students had maintained or improved SAT scores since 1973. Comment was requested on these factors:

- Course revision, addition, or deletion
- Graduation requirements
- Special SAT (or test) preparation programs
- Guidance programs
- Student/parent attitudes
- Evaluation procedures
- Testing conditions
- Faculty inservice programs.

The replies were generous; they were comprehensive, reflective, insightful, and significant. Together with the ETS study, they provide a synergistic profile of the schools successfully meeting the challenge of declining test scores. They also suggest practical guidelines to schools and communities for the educational factor in the total SAT equation.

The story in summary is rather direct. Schools with stable or rising SAT scores emphasize academic course work. This emphasis is expected and supported by the parents and the community. Some schools that successfully maintained high scores did so only with a special effort to encourage student enrollment in advanced mathematics and English composition classes, while also resisting with some success the national tendency for fewer courses in the foreign languages and physical sciences.

The schools with severely declining test scores, however, present a different picture. Enrollment dropped markedly in geometry and advanced mathematics classes, for instance, and the schools moved determinedly toward heterogeneous grouping. Perhaps, as

suggested by *On Further Examination*, these schools were too responsive to the popular demands and social distractions of the times.

The focus of this monograph, however, is upon the practices of schools with stable or rising SAT scores. Their story is best told by the principals themselves, juxtaposed with data from the NASSP and ETS studies.

The Successful Schools

WHEN WE EXAMINE school-related factors which can be assumed to play a significant part in SAT scores, certain areas of a school's environment come immediately to mind; course offerings and the focus of guidance programs, to name two. It is important, however, not to assume simple (or single) causes of the long and pervasive SAT test score decline. A changing student composition, according to the College Board's Advisory Panel, accounts for two-thirds to three-fourths of the SAT test score decline up to 1970.[2] At that point, the nature of the student population taking the SATs began to stabilize. The test score decline continued, however, through 1976 and 1977.[3] Most suburban, urban, small city, and rural schools continued to do less well each year regardless of the composition of their student body.

Holding against this national tide were a few high schools alert to the problem. These schools took certain initiatives or else maintained some specific "standards" that they considered important to the success of their college-bound students. They cannot be stereotyped, however, as they represent every region of the nation, range in size from under 700 to over 2,000 students, and are organized by grades 7-12, 9-12, and 10-12. Some are located in affluent, highly-educated communities; others are found in blue collar neighborhoods—a reason, incidentally, cited by one principal for high student motivation and for supportive parents who believe that a college education affords the best opportunity for upward mobility.

What is constant, however, is a certain agreement about priorities for the college-bound student. Parents and teachers jointly expect good academic progress, forecast those expectations to students, and work harmoniously to achieve that goal. This agreement on purpose is most evident in the area of course offerings and course content; it is less prominent for other school factors such as test orientation programs or special teaching strategies.

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2. *On Further Examination* (New York: College Entrance Examination Board, 1977), p. 18.

3. Echternacht, *Comparative Study of Secondary Schools*, p. 14.

Curriculum, Course Offerings, and Course Enrollments

CONSIDERABLE EVIDENCE exists that the SAT examinees from schools with steady or rising scores take more academic courses (e.g., mathematics, foreign languages, English, and physical science) than do examinees in the schools with severe decreases in SAT scores.[4] In fact, examinees in the steady or rising test score schools tended to take more of these courses during the period 1973-1976 than did their predecessors in the 1960s.

This focus on academic rigor is underlined by Pasquale J. Paolantonio, principal of Johnston High School (R.I.). He states:

> Over the years Johnston High School has maintained a rather traditional curriculum. We have not adopted many of the "fads" of education, although we have been responsive to the needs of the students in the addition of new courses and the constant revision of existing ones. We attempt to meet the needs of all of our students, but we have maintained an academic theme with emphasis on "college prep" courses. Student follow-up studies by the guidance department consistently reinforce our success with the college bound student. . . .
>
> . . . We have more demanding graduation requirements than do surrounding high schools.

Frequently mentioned also was student accountability for academic progress. Clifford Gillies, principal of Mariner High School (Wash.) from 1966 to 1977, makes these observations:

> An emphasis on the student role and accountability for learning is a contributing factor to Mariner's good test score trend. This emphasis includes continuous progress reports of the quantity of schoolwork completed . . . continuous quality measurement . . . a system that insures completion of "essential content" as prerequisite to the next unit . . . a curriculum organization that identifies essential content, recommended content, and enrichment possibilities.

Reinforcing this notion of emphasis on academic excellence are the following observations from Jerry Hansen, assistant headmaster of Detroit County Day School:

4. *Ibid.*, p. 14.

We have a very strong academic program, especially in English and mathematics, and I have the "gut" feeling that our College Board scores reflect to some extent the curriculum.

Students are required to study four years of English, as in most schools. In addition, they are required to study three years of a modern foreign language. However, the strength from upper school curriculum can be understood best by recognizing the requirements in our middle school (grades 5-8). Here we require the study of English grammar, vocabulary, spelling, and literature, as well as a foreign language. One third of our students study Latin in the middle school. It is these requirements, plus the standards set for each teacher by the administration, as well as the demands of the teachers themselves that result in real academic achievement.

Lawrence E. Grant, principal of Whitefish Bay High School (Wisc.), provides a personal view:

In very brief summary, I have always believed that the essence of anyone's education lies in developing through the basic disciplines. (Science, mathematics, English, and social studies in the main.) For both vocational furtherance and learning to enjoy life to its maximum, people must understand how to gain and use knowledge. We talk of "future" education as if it is something canned and ready to trot out to 16 year olds. Nonsense. The essence of future education is found in learning to relate to others, to understand how knowledge can be gained and used, how to inquire, how to conceptualize, etc. I continue to believe that the most basic disciplines, taught properly, are our hope for the future.

At a more specific level, what precisely did the successful school programs look like in the subject areas most closely related to the SAT aptitude tests? What content did the English and math departments of the rising or stable score schools teach, and how did they teach it?

The English Program

MORE THAN HALF THE PRINCIPALS responding to the NASSP questionnaire sent to schools with rising or stable SAT scores identified their English curriculum as contributing to good verbal scores. No other subject area was mentioned this frequently.

For instance, Martin Fagan, former principal of Rockville High School (Conn.), cites this emphasis to his school's English studies:

> The English program for the college preparatory students at Rockville High School is "traditional" in format and content, one that places emphasis on expository writing skills, grammar and usage, vocabulary, and literature. The literature program for freshmen and sophomores is presented by genre, for junior and senior students by chronological surveys of American and British literature. Electives supplement, rather than replace, the regular English program and offer semester or full-year courses in speech, short story, novel, drama, world literature, and creative writing.

Larry Buchanan, principal of Meadowbrook High School (Va.), cites the English program at the top of his list of reasons for maintaining stable SAT scores:

> There has been a strong emphasis on writing, grammar, spelling, vocabulary, and literature, and a movement away from experimenting with mini-courses in the English department.

Several principals mentioned specifically that students are required to take a full four years of English and that they may take additional English electives as well.

The ETS survey, in support of these comments about the importance of English, found enrollment in English classes to be a full four years in the stable-score schools as contrasted to 3.8 years in the declining-score schools (a difference significant at the .05 level). Several principals also mentioned that requirements for graduation in their schools were more demanding than specified by state law.

What sort of emphases may be found in the English programs of these schools? How much writing is required? What about quarter electives and mini-courses? Phyllis Duffy, director of guidance at Chatham Township High School (N.J.), responds:

We did not move to small units or "minis." We have semester courses, but urge all juniors to take Composition I either in the fall or spring semester. We also permit and encourage students to carry a double English elective; i.e., Composition I and Novel (fall), Speech and Short Story (spring). As guidance director I monitor all high school testing carefully and, with the English coordinator, carefully encourage students in need of remediation to take our Basic Communication class. Our goal is to have these classes stay small and move students out as they gain the skills. Our district also established a district Language Arts Summer Workshop six years ago and carefully reviewed topics to be taught K-12. This past summer it was done again with an emphasis on developing a district writing skills continuum.

William G. Holland, principal of Lock Haven Senior High School (Pa.), comments in like manner:

Traditional instruction continued in English. We resisted the trend to mini-courses and the resulting fragmentation in that area.

An emphasis on writing receives the strong endorsement of most principals, including Alton Sprague of Fairfield High School (Calif.):

We emphasize composition in the ninth and tenth grades. We also have a well developed honors program which requires teacher recommendations based upon student performance. The standards are high.

A strong plea for the classics is made by Jerry Hansen of Detroit Country Day School:

I would characterize our English program as the study of classical literature. If students are to improve their vocabulary, reading level, and analytical skills, they must be required to read literature like:

Camus: *The Stranger*
Hesse: *Beneath the Wheel*
Dostoevsky: *Crime and Punishment*
Shakespeare: *Macbeth*

We also have a planned program of vocabulary improvement for the college-bound students from grades 5-12. Special texts are purchased for this purpose. For example, at the junior and senior level (grades 11 and 12) all students work with Paternoster and Frager's *Three Dimensions to Vocabulary Growth* and *College Entrance Reviews in English Aptitude* by Orgel. At the tenth grade level all students use *Vocabulary for the College-Bound Student* by Levine.

Joseph T. Downey, principal of Mamaroneck High School (N.Y.), whose SAT scores moved upward in 1976, attributes some of the rise to:

> . . . a tremendous amount of hard work, time, and concentration upon improving vocabulary knowledge and reading comprehension. The English department committed itself to accomplishing these purposes three years ago. Contrary to the belief of some, it can be done.

Karl E. Fulmer, principal of Lexington High School (S.C.), attributes some of his students' successes to the "curriculum hub."

> Basic traditional courses form the curriculum hub for both the high school and its feeder schools. Survey courses are offered in English, literature, math, social studies, and science. These are full-unit courses spanning the school year. Requirements are set for each course by department committees to ensure that each student is offered a sequentially developed course of studies over a four-year period. Basic requirements for a diploma are derived from these course offerings. A strong emphasis is placed on the teaching of traditional grammar and vocabulary. Extensive parallel reading is required and a record of all parallel books read is kept for each student. Composition is stressed in all subject areas by encouraging the use of essay-type tests and the writing of scholarly research papers. To form a well-rounded educational program, additional courses are offered in the areas of music, art, languages, physical education, and vocational education.

Heavy emphasis is given at Edgemont Junior-Senior High School (N.Y.) to a six-year preparation program in English. Comments Joseph Doohan, principal of Edgemont:

> In each course—regardless of its intended content—grammar usage, punctuation, and related skills are taught; so in essence, our youngsters review for SATs in every English course they take over a six-year period. Also, we quantify writing experiences at all grade levels. Beginning in the eleventh grade a special preparation program is added:
>
> *Eleventh Grade (in class):*
>
> 1. Vocabulary development—a weekly assignment based on words often used on SATs.
> 2. Constant practice, with vocabulary tests, of analogies. Analogies always constitute a major portion of questions on SATs.
> 3. Thorough review of usage as practice for the Standard English section of SATs.

4. Review exercises, handled in class (of former SAT questions from practice and review book) with emphasis on reading comprehension section.
5. Review of probabilities of test taking (eliminating guesses, thorough reading of questions, etc.).

Eleventh Grade (after school):

All eleventh grade teachers devote time during extra-help days for SAT review. It has been our experience that only a *very few* ever avail themselves of this service. Unlike mathematics that tests *specific* skills, the verbal section of the SATs deals with generalizations.

Twelfth Grade (in class):

Review of grammar and usage for achievements in "day out of cycle" small groups.

Twelfth Grade (after school):

Same applies as eleventh grade extra help.

Lest the reader become too enamored of "short cuts" to test score success, Doohan offers this counsel:

> Our ability to know our youngsters extremely well and thereby provide rather specific programs for their assistance has a direct effect upon their academic success. . . . We have terminal performance objectives which are revised on an annual basis to assist us in determining academic experiences for students within all our academic areas. The SATs examine some of the student skill and knowledge areas we consider important to preparation for college. We do not believe in teaching specifically toward the SAT test as an end in itself, however. That approach is too limited.

The Mathematics Program

PERHAPS THE MOST DIRECT relationship between academic course enrollment and SAT scores can be found in mathematics. The SAT mathematics test would be difficult for a student who had not completed successfully a course in algebra and geometry. The thought processes and concepts required for the SAT mathematics test are inherent to those courses. In addition, advanced math courses beyond algebra and geometry exercise and reinforce talents important to the test.

The NASSP study and the ETS survey both highlight this relationship. Almost half of the NASSP respondents reported emphasis in mathematics as an important factor in score stability. For example, Phyllis Duffy, director of guidance at Chatham Township High School (N.J.), states:

> In math we have, through counseling, urged our students to carry at least two to three math courses during their high school years. Summer workshops have concentrated on producing a continuum and checking for gaps. We've noted a deficiency, through testing and analysis in fractions and percentages, and this is now being remediated. We permit students to carry Algebra I while remediating. We also allow students to accelerate in math by permitting a prescreened group to study Algerbra I in grade 8, and by encouraging a well-motivated and capable upperclassman to carry two college preparatory math classes.

Adds Martin F. Fagan of Rockville High School (Conn.):

> All teachers and students are expected to cover a minimum of "core" topics in each year's math course. We are careful to hire teachers who have a strong mathematics background as shown in their college transcripts.

The strongest statement supporting a high enrollment in advanced math classes came from Jerry Hansen of Detroit Country Day School (Mich.):

> A high percentage of our students continue taking mathematics through the senior year. Maintaining math skills and continuing to develop mathematical thinking contributes, I am sure, to our high

math Board scores. The academically talented student begins the study of A.P. calculus in the junior year; other students take a college level algebra and continue the following year with a calculus below the level of A.P. calculus. The academically talented continue to study calculus in the senior year in order to prepare for the A.P. Calculus BC examinations; other advanced mathematical concepts are studied in this course.

A special math course is mentioned by Clifford Gillies of Mariner High School (Wash.) as potentially helpful:

> The year 1977 was the first time a specific mini-term course in testing for math was offered. Two sections of students took the course. (I am calling attention to this course even though it did not have any bearing on the specific statistics being discussed.)
>
> The response to the class was positive. Students worked and became interested when they lacked motivation in the regular term. The content of this class stressed understanding the *why* of mathematics, showed short cuts at arriving at solutions and practice at obtaining speed. Properly taught, this course should influence the students' SAT scores.

The ETS study reinforces the notion that enrollment in geometry and advanced mathematics classes supports good test scores. Its survey of 60 schools with stable or rising SAT scores[5] and 60 schools with severely dropping scores (a mean of 90 points in math during 1966-1976) identified a dramatic difference in geometry class enrollment between the two groups. Only six percent of the schools with stable or rising scores reported a decrease in geometry class enrollment, whereas some 33 percent of the schools with declining SAT scores reported a decrease in geometry class enrollment. Similarly, enrollment in the more advanced math classes decreased 39 percent in the declining score schools as contrasted to 18 percent in the stable or rising score schools.

Aside from the questions of course content and course enrollment, what may a school do to improve the preparation of high school students in mathematics for rigorous tests and college courses? The Board of Governors of the Mathematical Association of America and the Board of Directors of the National Council of

5. During the period 1973-1976, four of the schools had improved scores in math and English tests for all three years, 26 of the schools had improved scores in five of the six tests, and 30 schools had improved scores in four of the six tests.

Teachers of Mathematics in 1977 released recommendations for preparing students for college-level mathematics. Their recommendations are included as Appendix B of this report.

Other Subject Areas

IN RESPONDING TO NASSP'S LIST of open-ended questions, only two principals specifically mentioned science advanced placement courses and only one principal identified foreign language instruction as contributing to stable SAT scores. (Almost all principals had mentioned "academic rigor" as important.) The ETS study, however, found that male students from the stable or rising score schools had enrolled in two years of physical science, on the average, as contrasted to a mean enrollment of 1.6 years for males in the declining score schools. The enrollment figures for science, then, reflect those of mathematics in the two groups of schools.

The relationship between enrollment in foreign language classes and SAT verbal test scores is muddied by a sharp enrollment decrease in the stable score schools as well as in the declining score schools. The Echternacht study found that 61 percent of the declining score schools and 51 percent of the stable score schools had experienced an appreciable drop in modern language enrollments.

One private school in the NASSP study, however, considers foreign language to be an important factor:

> One requirement that contributes to the verbal development of our students is modern foreign language. We require three years of a modern language for graduation. Also, we offer Latin through A.P. Latin and strongly encourage all students to study the subject.

Perhaps equally as important as the developing picture that enrollment in academic courses tends to improve SAT scores is the fact that schools with good test score records can also provide some intelligent options for students. That is, schools do not need to emphasize college preparatory classes to the exclusion of all else in order to provide a strong academic education. For instance, some 67 percent of the schools with stable or increasing test scores expanded their work experience programs during 1966-1976; whereas only 42 percent of the declining score schools expanded their work experience programs.

Since work experience and community service courses are considered by many educators as "motivators and maturers" of stu-

dents as well as an important bridge between a vicarious-based book education and an experience-based adult world, the gains made with this approach to learning over the past five or six years need not be sacrificed upon the notion that "action learning" hurts SAT scores. On the contrary, it appears that the quality of an experience, rather than its location, determines its educational value. For example, Thomas Gutridge, chairperson of the guidance department at Oak Ridge High School (Tenn.), describes his school as follows:

> We are now a totally comprehensive high school. Our curriculum encompasses 10 academic disciplines, 15 vocational/technical courses, an inclusive special education facility for the learning disabled, eight community involvement programs, and three courses (biology, Spanish, and U.S. history) taught on our campus with college credit via the University of Tennessee, Knoxville.

The emphasis is quality at all levels for all programs. Rather than employing a "teeter-totter mentality," one that imagines schools with strong academic programs to be ignoring the noncollege curricula, and vice versa, the schools with stable and rising test scores appear to be concentrating on a high level of effort from students and faculty all across the board. The learning environment is serious yet broad and imaginative.

Karl E. Fulmer, principal of Lexington High School (S.C.), makes this observation about the importance of quality in the broad sense:

> While many schools and school systems are looking for special programs or courses as the answer to declining SAT scores, the answer may be cloaked in the more subtle aspects of a school's program. . . . A return to the basics in course offerings may be only part of the answer. There may be a need to "return to basics" in teacher attitudes, student discipline, academic requirements of students, and community support as well. Here lies the answer for maintaining student performance as is represented by tests such as the Scholastic Aptitude Test.

Counseling and Guidance

COUNSELING PROGRAMS PLAY a significant part in maintaining good test scores, according to respondents of the NASSP survey. A surprising number of principals, about 50 percent, consider education-oriented guidance to be important to the success of their students' scores.

Marjorie S. Lerner, principal of Stephen T. Mather High School (Ill.), makes this point:

> The guidance and counseling program, with its successful regular group guidance activities as well as individual counseling, has contributed significantly to student awareness and understanding of college prerequisites and precollege testing programs, including those offered by the College Entrance Examination Board.

Two counselors responding to the NASSP survey substantiate this view. Phyllis Duffy of Chatham Township High School (N.J.) writes:

> Our counselors have a manageable load and are very involved with our students, parents, and curriculum. Their feedback is considered vital in maintaining and improving the curriculum. The testing analysis of the English Coops for grades 9 and 11, and the SCATs for grade 10 are carefully reviewed and individual educational prescriptions are often given to student and teacher to assure the student's continual academic growth.

And, Thomas Harrison, counselor at William Penn High School (Del.), writes:

> I have tried to get students to take as much math as possible. Also, I do not permit students to move to a lower English level unless parents are consulted beforehand. Other counselors are encouraged to think along this line.

One repeated focus of the principals' comments about counseling programs concerns diagnostic appraisal of individual students with planning for students based upon that diagnosis. A careful monitoring of each student's educational deficiencies is followed by some specific program planning to correct the deficiency noted.

Clifford Gillies of Mariner High School (Wash.) describes Mariner's system as having four dimensions:

- The Adviser-Advisee Program for the past 10 years provides each student an ongoing evaluation of progress and/or weaknesses with weekly accountability. We feel this causes all students to better recognize their abilities. Although all students are eligible to take the SAT, they have access to advice from an adult with whom they have a three-year relationship.
- Teachers, acting as advisers, have become very familiar with diagnosing weaknesses of each individual student.
- The advisers receive, and may interpret, all test results with their advisees.
- Counselors provide advisers with test result materials, interpret in large groups of students and parents the results, and assist in relating test results to curriculum improvement.

Philip Boone, principal of Abilene High School (Tex.), focuses upon planning with students to help them achieve some specific goals:

> We may have done more in the guidance program than most high schools by helping students to determine, in view of their post-high school goals, (1) whether they needed to take an admissions test, and (2) which test they should take. Generally, the more selective colleges require the SAT, and most of the students with serious plans to attend such schools were counseled concerning admission requirements.

Joseph Downey, principal of Mamaroneck High School (N.Y.), passes along this counselor opinion about good SAT scores:

> More students are specifically conscious of the ingredients they will need for the SAT; namely, vocabulary, reading, and math skills. Furthermore, many with our encouragement are working independently or in class sessions to improve their skills.

In summary, priority in the stable or rising score school is given to educational counseling and not to social or personal counseling.

Test Preparation

CLOSELY RELATED TO GUIDANCE programs which emphasize academic preparedness are special courses or activities aimed directly at preparing students to take the SAT examinations.

Mariner High School offers a six-week mini-term course each spring in mathematics especially tailored for the SAT math examination. Also, all college-bound students at Mariner are encouraged to take the PSAT as a practice test for the SAT.

A testing center operates all year at Mariner, with students taking a majority of their course examinations there. This arrangement results in students "not being afraid of testing," according to Les Kirkendorfer, college information counselor. He schedules evening test interpretation sessions for students and parents, resulting in parent awareness of the purposes and uses of all group tests. These sessions increase the interest of parents in all phases of the school's testing program. This interest, in turn, is reflected in increased student motivation to take and perform well on group tests.

The Detroit Country Day School introduces ninth grade students to the kinds of questions they can expect to see on the SAT. The school also administers the Educational Record Bureau's SCAT test to obtain predicted College Board scores. The English and mathematics departments also review these test results.

A summer SAT workshop is offered by Detroit Country Day School to familiarize students with test content and to relieve student anxieties about the SAT. The workshop includes a review of these topics:

- mechanics of the test
- scoring the test
- test strategy for verbal and math section
- analogies
- sentence completion
- antonyms
- reading comprehension
- complete review of mathematical concepts
  a. general math

b. algebra
c. geometry
d. sufficiency data problems
e. quantitative comparisons

- writing ability.

William Penn High School has offered since 1974 a course entitled College Board Review. The semester course is provided for seniors prior to the December SAT date. It is a "programed review of algebra I and geometry," open to any interested student at the school.

Edgemont High School provides an individualized test preparation program for students. Joseph E. Doohan, principal, describes its opportunities:

> In the Edgemont High School resource room students may practice for the SAT examinations. Specialists in the resource room have many books and aids available to guide the student in a self-instructional program.
>
> The specialists explain to the students the format of the examination (six parts, 30 minutes each), the subjects that are covered, how they are scored and reported, and general test-taking techniques (skipping questions, guessing, directions, and timing).
>
> Next, the student is given hints about efficient ways of studying and concentrating. Also, the student is told how to self-analyze strengths and weaknesses and is given methods to improve in weak areas.
>
> Tapes are available for listening and the student is given sample tests with answer sheets supplied for practice. The tests are model SATs that are similar to actual examinations in format, content, and level of difficulty. As the students take these tests, they are timed.
>
> Books are available for the student to review verbal basics, etymologies, synonyms-antonyms, sentence completions, and analogies.
>
> Practice in reading comprehension and vocabulary words similar to those found in the SATs are available for drill. In mathematics, fractions, decimals, percentages, coordinate geometry, and plane geometry samples are available as well as practice in quantitative comparisons and number-series questions. The student may also work on review and practice of acceptable forms of written English, and review of grammar rules for standard English.

Dr. Doohan concludes his remarks by emphasizing that these exercises merely "top out" many solid years of schooling. He underlines this point:

> Years of excellent teaching by faculty members in English, mathematics, and other disciplines have given the student a strong foundation, providing the resource room specialists with much to build upon.

Grouping and Grading Practices

ACCORDING TO THE ETS STUDY of the steady score and the decreasing score groups of schools, some 33 percent of the schools with falling test scores made an effort from 1966-1976 to expand heterogeneous grouping while only 10 percent of the schools with steady or rising scores moved toward more heterogeneous grouping. The difference is statistically significant.

This tendency for schools who have maintained good SAT scores to prefer homogeneous grouping is verified by the NASSP study. One in four principals mentioned ability grouping as important to their good test scores in responding to the open-ended NASSP questionnaire.

For instance, A. R. Cramer, principal of Newton High School (Conn.), comments:

> We have courses designed for those performing "above grade level," we have courses designed for those performing "at grade level," and courses designed for those performing "below grade level." Each level is weighted differently. The weighting has in our judgment caused two positive actions. First, students in this school stay in academic programs the equivalent of four or five years. Second, teachers in weighted courses are able to maintain standards and teach at a predetermined rate.

The schools in the NASSP study group by courses, not by broad programs such as "college prep" or "general." The content for the higher level courses in English and mathematics is definitely aimed at the college-bound student, often culminating in "advanced placement" or "college level" classes for twelfth grade students.

Grade inflation as a negative factor appears unrelated to falling SAT scores. The ETS study indicates that the grade averages of students rose modestly in the stable score schools but actually remained about the same in the decreasing score schools over the period 1965-1976.

No relationship between homework and SAT scores could be identified in the survey by ETS. In fact, some 39 percent of the schools with falling test scores had made a major effort during

1965-1976 to increase homework, while only 14 percent of the schools with stable or rising scores mounted a similar effort.

Both groups of schools appeared to be similar in other aspects of the school program surveyed by ETS. They were virtually identical in per pupil cost, and no significant differences were found in use of teacher aides, "nontraditional courses," new textbooks, audio-visual aids, and pass-fail grading.

Teacher Factors

MENTIONED QUITE PROMINENTLY in the NASSP study was the importance of teacher attitude and expectations to maintaining good SAT scores. In fact, teacher factors were cited by the principals about as often as were the English curriculum and the guidance program.

Lawrence Grant, principal of Whitefish Bay High School (Wisc.), provides this perspective on the staff equation:

> Expectation by the teachers has remained high. This sometimes hurts the average or below average ability student. We have worked hard to improve that . . . yet we have held to standards. This is a function of many agents, a primary agent is the teacher . . . but are teachers willing to work in the same sense as we once thought they did? I am concerned with some of the younger teachers. Their level of expectation isn't as high as I would hope. With a young idealist you would expect the opposite.

The concern about staff experience is reiterated by other principals. Typical comments include:

- We have been able to recruit and keep a very concerned and conscientious faculty. Their classroom work is appreciated by students, parents, and administration. Their course assignments are awarded so that their individual expertise is utilized to the fullest.
- We have been blessed with competent and dedicated teachers who are well qualified to teach the subjects assigned.
- The high school faculty has been very stable. The fact that staff members were deeply involved with the development of the philosophy and total program and have remained in the school has been important to continuity and the achievement of instructional improvement.

These testimonials to the value of a veteran teaching staff are reinforced by Echternacht. He found that teachers in schools with steady or rising scores tended to have more experience than did teachers in schools with decreasing scores.[6] He also found that

6. Echternacht, *Comparative Study of Secondary Schools*, p. 11.

teacher turnover is greater in the schools with decreasing score averages than in the schools with steady scores.

Administrators as well as teachers were also found to have stability, according to the ETS study. Some 90 percent of the principals who responded to ETS's questionnaire in 1976 said they had been at the same school in 1965. Considering that a national survey of the principalship by NASSP in 1977 found only 23 percent of the high school principals to have been in their current school nine or more years, the long tenure of principals in the successful schools is indeed of interest.[7]

The educational level of teachers also is of interest. The schools with steady or rising scores tended to have more teachers with an education beyond the bachelor's degree than did schools with decreasing score averages. Some 74 percent of the stable score schools reported to ETS that their faculties had completed more graduate work in 1976 than in 1965 as compared to 55 percent of the decreasing score group. The difference is not statistically significent, however.

The principals of the stable scoring schools see teachers as contributing more than academic expertise to their students' test score successes. Typical of the comments made about the importance of a positive attitude and of good psychological support for students are these observations of Karl E. Fulmer of Lexington High School (S.C.):

> Attitudes such as helpfulness, interest in and caring for the individual student, and high moral and ethical standards are stressed with teachers. They are expected to promote and develop those desirable traits which in turn promote, develop, and encourage high standards of personal and professional conduct. Anything less distracts from the educational environment.... Teachers must be facilitators of learning and models for the students they teach. To ensure success in a school program the teachers must be willing to work for the benefit of the school and community.

This attitude of helpfulness, however, is for a purpose—to encourage and assist student achievement. A representative faculty as described by the principals in NASSP's study of successful schools

7. Findings from this National Study of the High School Principalship by NASSP are being published in 1978.

would include these characteristics: experienced, educated beyond the bachelor's degree, committed to "high standards," demanding of student effort, supportive of student progress, and interested in developing academic competence in students.

Student and Parent Factors

THE ONE FACTOR MOST FREQUENTLY mentioned by principals as contributing to good SAT achievement was student and parent attitude. Eighty percent of the principals in the NASSP study identified student, parent, and community outlook as critical to good scores. Typical comments are:

- Though we would have difficulty predicting with great accuracy how any given graduating class might perform on any given examination, I think we can safely say that our quality of teaching and support staffs, curriculum, and student/parent expectations play important roles in how well our students perform on the SAT and other such tests. Since our community is made up of high-degreed, professional people, its motivation for achieving academic excellence is one expected of students and school system alike.
- This district tends to be a lower middle class one. Many students are the first generation to college. This helps us because parents want better lives for their children and support the school's efforts in that direction.
- One of the prime factors would be student/parent attitudes and motivation. The socio-economic background of our typical student is such that the student is interested in a high level of achievement and works to accomplish this goal with encouragement and support from the family. A large number of our graduates go on to higher levels of education, and this goal tends to serve as a motivating factor for them as they work toward college admission.
- Parental demand—particularly of their own children. This appeared not to be the case in the 1960s when support for teachers in their effort to maintain "quality" diminished greatly and may well have been replaced by outright opposition.
- The student body is an ethnically diverse group, once mainly Jewish and still significantly so. A large portion of the replacement student population is Asian; thus a long-established pattern of striving for academic success has been maintained. Our students are active and involved, both in school and in the community, and this pattern tends to create a happy group of young people.

Balanced against this testimony are data from the ETS study that show students in both the stable and decreasing score schools to be less motivated today than in 1965. The ETS respondents reported students in 1976 to be more often truant, delinquent, and requiring disciplinary action than in 1965. The 1965 students, furthermore, were perceived as more motivated to achieve high college admission scores and more willing to compete for admission to selective colleges than were their counterparts in 1976.

This picture is mitigated somewhat by testimony in the NASSP survey of principals conducted in 1977. Among the responses received:

- Among college-bound students, attitudes are excellent. Students are highly motivated and competitive. Approximately 25 percent of our senior students are elected to the state Honor Society each year. They have maintained an average of 85 percent for three years as a condition for election. There is considerable student and parent concern for upward social mobility—academically and economically.
- Students are more receptive to learning situations. Attitudes have changed from a more free to a less free time. Better use of leisure time is evident.
- We are convinced by the behavior exhibited by our students that many have pride in the school's academic program, the school's interscholastic program, and the school's extracurriculum program. A very high percentage of our student body is involved and likes being here. For example, our math team has been undefeated for four years.
- The brighter students, as well as a majority of the staff, have realized that to learn one must struggle academically as one must struggle physically to be an athlete. Therefore, they are ready to accept higher standards for academic achievement.

Minority students were well represented in the schools with stable or rising SAT scores. These schools reported an average of eight percent of their current enrollment as coming from minorities. Nationally, for all secondary schools, the minority representation is 13 percent. Schools in the ETS study with the most steeply decreasing SAT scores reported an average minority representation of 35 percent in 1976, up from 20 percent in 1965. These data are provided within the perspective afforded by the Advisory Panel to the

Scholastic Aptitude Test Score Decline which reported that "compositional" changes in the test-taking population were not significant, nationwide, after 1970. Causes of the continued SAT score decline nationally beyond that date must be sought elsewhere.

Summary

SCHOOLS ALONE ARE NOT responsible for the 10 year decline in SAT scores. The advisory panel report, *On Further Examination*, and subsequent remarks by Willard Wirtz, chairman of the panel, make this abundantly clear. The decline comes from a myriad of social factors, including the obvious (family variables, television) and perhaps even the esoteric (food additives, court rulings). The panel, quite wisely, acknowledged that broad forces were at play.

But schools, as well as families, play a central role in the education of children and youth. The schools' perspectives about the test score decline, its causes and possible solutions, are important to a better understanding of the problem.

The NASSP identified 34 high schools whose students had maintained or improved their SAT scores from 1973 to 1976 and whose mean scores in 1973 were approximately the same as in 1965. These schools, listed in Appendix A, represent a larger group of schools whose SAT scores have remained up. The Educational Testing Service identified 60 schools with 1965 and 1968 SAT scores close to the 1973 scores, and who had test score increases from 1973-1976 for at least four of the six verbal and mathematical tests.

The 34 schools identified by NASSP were mailed a series of open-ended questions requesting the professional opinion of the principals about the reasons their students had maintained or improved SAT scores in the face of a pervasive 10-year decline nationally.

The chief responses can be placed under seven headings: (1) "academic rigor," (2) English curriculum, (3) mathematics curriculum, (4) guidance programs, (5) grouping and grade weighting, (6) teacher attitudes and expectations, and (7) parental and student attitudes and expectations. While the principals believe that "the problem is bigger than the schools," they are convinced that their curricula, their counseling, and the commitment of their teachers, parents, and students have taken up much of the slack caused by broad social factors.

These principals believe that their schools *do* make a difference.

This "difference" does not come from a bag of new tricks. Nor does it come from any one course or particular methodology. The difference comes, to state it simply, from a singular commitment to academic achievement for the college-bound student. The constant among the successful SAT score schools is intent, not technique.

While intellectual rigor is expected from students in these schools, the expectations appear to be modulated by counseling programs which orient students to these expectations and assist students in reaching them. Perhaps even more significant to student motivation is the support of parents and teachers who agree that preparation for college should reflect the kinds of academic competencies that happen to be measured by the SAT test.

In summary, the schools who have maintained SAT scores at or above the 1965 level believe that college-bound students should face a moderately stiff curriculum, be counseled as to its value, be supported in its attainment, and be examined on its outcomes.

Little evidence exists that the schools with stable or rising test scores are teaching an SAT curriculum. While some schools do offer special short-term courses or mini-sessions aimed at the SAT, the principals point out that the good scores are a result of a broader academic effort, especially in English and math. They see the stable scores as a result of vigorous study over a period of years rather than as an acrobatic finish.

In sum, the causes of good test score outcomes are synergistic and not singular. The scores are a by-product, not a narrow goal. They reflect expectations and effort, not wizardry.

Schools with no interest in SAT scores should nevertheless be aware of the probable causes of good scores. The PSAT/NMSQT test identifies students eligible for National Merit Scholarships and for letters of commendation useful in obtaining financial assistance from public and private sources. Items for the PSAT/NMSQT test are similar to items for the SAT test.

In the final analysis, a community gets what it wants in the way of public services, including education. If parents and other citizens want educational excellence, if they place a priority on good programs, whether they be English or science or art or business or work-experience education, then all students ultimately will be served well. If, however, benign neglect enters and some programs are ignored, or achievement is ridiculed as "elitist," then the outcome is predictable.

The schools who have maintained stable SAT scores appear to have finessed the problem of a faltering competency in verbal and mathematical skills, as measured by the SAT, by continuing to set standards and then achieving those standards with their students in their own way, regardless of other priorities which require attention. No evidence exists that they ignored the other priorities. Rather, they proved to be apt jugglers, keeping all important balls in the air.

Finally, it is important to note that the schools in the NASSP study and the ETS study cannot be stereotyped as either innovative or traditional in methodology. Their approaches to instruction were varied, from a system of continuous progress with a close monitoring of individual students, to rather strong insistence upon daily group instruction in the classroom. A structure for learning was provided, however, regardless of the methodology at hand. The structure was content—course content—leading toward some carefully defined outcomes. These outcomes were considered by teachers and parents as important to their student's success in college and beyond.

The Guidelines

THE SCHOLASTIC APTITUDE TEST is a measure of the verbal and mathematical capabilities important to getting good grades in college. It is not an achievement test, per se, but obviously students must have some familiarity with the content of the questions to score well.

The mathematics section of the SAT examines reasoning, algebraic concepts, and geometric concepts. The verbal section examines antonyms, analogies, sentence completion, and reading comprehension. The "practice value" of the test is about 15 points. Students who take the PSAT or the SAT will, on the average, increase their scores at the second testing by 15 points.

High school grades continue to be the best single predictor of college performance. When these school grades are combined with SAT scores, however, a more accurate prediction results than when the grades are used alone. Even when employed by themselves, the predictive validity of SAT scores is substantial.

The median validity coefficients of SAT scores and of high school grades for 1974 as reported by the College Entrance Examination Board were:

High school grade records	.50
SAT verbal score	.42
SAT math score	.39
All three factors combined	.58

While usefully predictive of college performance, the SATs do not measure a number of additional aptitudes related to student achievement. For instance, the important intellectual processes of fluency and originality are not examined. Other qualities of a more affective nature, such as social perceptivity, also are not a part of the SAT instrument. These factors together with student personality traits cause school grades to be more predictive than are the test scores of the current college aptitude tests.

Despite the imperfections of tests generally, and despite the relatively narrow focus of the SAT, this test remains a useful indicator of the probable college performance of students. Certainly it is wiser

to use the best instruments at hand to assess college aptitude rather than to shun them entirely. Mathematics is the language of technology and society is becoming ever more technological. Measures of mathematical aptitude, therefore, are important to identifying the mathematically talented student so that this crucial aptitude may be developed.

Moreover, in a world of instant and overwhelming information, it is imperative for the sake of maintaining knowledgeable communication that opportunity be provided for the cultivation of important verbal aptitudes such as vocabulary, comprehension, and language usage. The SAT focuses upon these two essential aptitudes for students, parents, and colleges interested in their identification and development.

The guidelines for improving SAT scores are proposed to secondary schools within this context. They are not offered as a panacea because no easy formula exists to what can only be the outcomes of serious learning over a period of time. They are not offered, either, for the single purpose of a high numerical test score. Rather, they are offered for the importance of what the scores represent—competence with verbal and mathematical concepts.

The comments of principals, counselors, and teachers from schools who successfully have maintained good SAT scores, together with the limited data available from the ETS and NASSP studies, form the nucleus for these guidelines. The guidelines, therefore, are based largely upon professional judgment. They are not based upon irrefutable data. The subject is far too complex for irrefutability, objective or otherwise.

Professional insight, the opinions of educators who work successfully with youth year in and year out to keep SAT scores from falling, may well provide the best possible advice for schools interested in improving the preparation (and SAT scores) of their own college-bound students. The guidelines were framed from this insight.

1. GUIDELINES FOR ENGLISH

College-bound students should enroll in an English class during each year of attendance in a secondary school. The English curriculum must emphasize, but not be restricted to, expository writing, language usage, vocabulary, and serious literature.

Reading should be extensive as well as intensive. Writing should grow from the single paragraph to the five-paragraph theme as stu-

dents improve their composition skills. Every paper should be evaluated by a teacher and returned with appropriate comments. Opportunities to write should be frequent and the papers relatively short. Long and infrequent tomes are of dubious value. Writing is a craft, and attaining craftsmanship in any field requires constant practice.

Electives should supplement, rather than replace, the main line English program. Elective courses are important, however, to the interests and growth of students and so schools need to offer a wide range of electives including speech, creative writing, dramatics, journalism, and literature or the novel. For large schools an even more extensive slate can flourish to include film or poetry or mass media.

English teachers need a solid background in composition. Their familiarity with literature is important to good instruction, but alone it is insufficient. New teachers employed to teach English should have completed, as a minimum, an *advanced* composition course in college. Schools also will probably find it useful to plan inservice programs in composition for current staff members.

2. GUIDELINES FOR MATHEMATICS

The successful completion of courses in algebra and geometry, as a minimum, is necessary to good SAT scores. Pursuit of mathematics to this level is increasingly useful to college work in many "nontechnical" fields; for instance, business, psychology, and sociology. The quantification of information, the growth of statistical applications, and the aggressive use of computers in business and the social sciences require an ability to use algebra with some understanding.

A geometry course is helpful because it introduces the student to deductive reasoning, useful to problem resolution in many walks of life as well as with the SAT test questions. Geometry also provides experience in visualizing three-dimensional figures and in applying formulae for areas and volumes.

Advanced mathematics courses, especially Algebra II, trigonometry, and functions (also called precalculus) increase the likelihood of good SAT scores because these courses maintain and reinforce important applications studied only briefly in algebra and geometry. A third year of math, therefore, is recommended for students earning a "C" grade or its equivalent in algebra and geometry. This may

be a review course for students experiencing difficulty with algebra and geometry so that the concepts of these courses become more clearly understood.

The joint recommendation of the Mathematical Association of America and of the National Council of Teachers of Mathematics for high school mathematics programs includes this admonition:

> We are aware that teachers must struggle to maintain standards of performance in courses at all levels from kindergarten through college and that serious grade inflation has been observed. An apparently growing trend to reward effort or attendance rather than achievement has been making it increasingly difficult for mathematics teachers to maintain standards. We recommend that mathematics departments review evaluation procedures to ensure that grades reflect student achievement. Further, we urge administrators to support teachers in this endeavor.

Complete recommendations by the two groups for the preparation of high school students for college mathematics are found in Appendix B.

3. Guidelines for Ability Grouping

Students should be ability grouped in English, mathematics, and science as a minimum. Some schools who have maintained good SAT scores also recommend grouping in social studies and other verbal subjects.

Ability grouping, as practiced by the majority of schools with steady or rising SAT scores, is organized subject by subject according to the aptitude and prior achievement of students. The schools do not "track" students into broad programs such as "college prep," "vocational," "general," etc. Such tracking practices are unnecessarily restrictive since a student may have a high verbal aptitude and an average mathematics aptitude, or vice versa.

Beyond advising against tracking by broad programs, no single ability grouping practice is specifically recommended. The successful SAT schools used various approaches, ranging from a "continuous progress" plan whereby all students begin at a common initial point in a course of study and then advance at their own pace to the more traditional plan of two-level and three-level groupings for academic courses. Advanced placement or a similar college-level course in English is offered to seniors in the majority of successful schools that are maintaining strong SAT scores.

This recommendation for grouping is substantiated by data released in 1977 on the National Longitudinal Study of the Class of 1972, which show that ability grouping "is the single most powerful predictor of college attendance."[8] This national study also shows that students in college prep courses earn higher math achievement scores than do students in ungrouped classes.

4. Guidelines for Counseling Programs

Counseling programs for college-bound students should focus upon these services:

- Analysis of ninth or tenth grade achievement test results, student by student, to include recommendations for correcting academic deficiencies.
- Discussion of educational goals and career goals and of progress toward those goals.
- Development of appropriate plans to reach the defined goals.
- Information about college admissions procedures and requirements.
- Orientation to precollege testing programs.
- Encouragement to step up to some challenging courses rather than sliding through school by the easiest route available.

In addition, arrangements should be made for recent graduates now in college to talk with groups of high school seniors.

The aim of a guidance program for college preparatory students should be to give these students an awareness of the various requirements to enter college and an understanding of the many linkages between high school and college course work. Any student planning to attend college who has not been sufficiently informed by the high school about the full details of this transition has been cheated by the counseling program.

Counselors should be involved in curriculum revision. Their perspective is vital to the improvement of courses, especially in grades 11 and 12.

8. *Education U.S.A.*, 9 January 1978.

5. Guidelines for Special Preparation

Special test preparation opportunities should be available to students on a voluntary basis. Such programs cannot be considered an imperative for good SAT scores since only about 25 percent of the schools with stable or rising scores offer special test preparation programs. The schools that do provide special coaching in the SAT content areas, however, are convinced of the value of their efforts.

Two benefits accrue from a voluntary program of test preparation: (1) individual students with a strong need or interest may attend without obligating an entire class, (2) pressures to base the college prep English or mathematics courses narrowly upon SAT content can be resisted more easily.

Test preparation programs follow a range of patterns. They seldom exceed a semester and often only consist of 10 to 15 meetings. Or, they may be essentially a program of independent study supplemented by resource persons. Whatever their nature, students should have the privilege of participating in a school-sponsored program and not be forced to rely upon the open market for this kind of important professional assistance.

Sophistication in test taking, as well as a familiarity with test content, can raise student scores. Practice tests, therefore, should be available to students in the counseling departments of schools as well as being a part of special test preparation courses.

6. Guidelines for Students and Parents

Student and parental attitudes are critical to good SAT scores. No school curriculum, however brilliantly conceived and taught, can compensate for student disinterest. Ambivalence is the dry rot of a solid academic performance.

School after school in the NASSP study gave testimony to a strong unity of purpose among parents, students, and teachers. The joint priority, to oversimplify, was pursuit of excellence. The schools with stable or rising test scores credited students and parents with high academic aspirations and a commitment to work toward those aspirations. More principals reported this attitude as important to maintaining SAT scores than any other single factor.

The central question about good SAT scores that only students and parents can answer is: How serious is your commitment to academic achievement?

If a commitment exists, then the second step to excellence of achievement for the college-bound student is to ask the same question of the faculty and principal: How serious is the school's commitment to a strong academic program for students planning to attend college? If a joint commitment exists, if the perspective of all parties supports quality education, then your high school will reflect the expectations of students, parents, and teachers in the 34 schools with rising or stable SAT scores studied by NASSP.

Attitude bears on the problem of decreasing SAT scores because scholastic aptitude, as currently measured, comes not from nativism alone but from educational experiences as well. These experiences reflect attitude as well as opportunity to learn.

Pollyanna has little place in the no-nonsense outlook the public carries today about its schools. Yet, a positive ambience at school clearly has replaced the divisive mood of the early 1970s. Many students today—perhaps sobered as are their parents by economic pressures—appear to believe that achievement in school, in college, and in life itself depends most upon their own purposefulness and productivity. Certainly parental and teacher expectations count, but the growing Gestalt among students generally is an inclination to work again for academic goals. Parents and teachers, once the cheering stops, should support this inclination.

7. Guidelines for the Professional Staff

Some general guidelines apply to the professional staff in addition to the specific recommendations made for English, mathematics, counseling, and ability grouping.

Just as the professional staff in the schools with rising or stable test scores complimented parents on their positive attitude toward academic achievement, so did the parents of these schools pay tribute to teachers, counselors, and principals for dedication and professional competence. Some questions that might be asked of a faculty concerning a strong preparation program for college-bound students include:

- Are good standards of language usage and writing mechanics expected in all subject areas?
- Are essay questions typically included in major tests?
- Is academic achievement recognized by various means other than at the Senior Awards Assembly?

- Is the school atmosphere one of encouragement and support *for a purpose*—that of gaining a good education?
- Is the mutual expectation established that teachers and students will work seriously but also with imagaination and good spirit?
- Do inservice programs relate to the immediate classroom needs of teachers and students?
- Are faculty members prepared beyond the bachelor's degree in their subject areas? Are they expected to take additional professional work from time to time?
- Are students encouraged to seek supplementary assistance from teachers as needed? Do teachers make themselves available to give this assistance?
- Is pride of accomplishment a part of school life in activities, athletics, *and* academics?
- Is faculty turnover relatively stable?
- Is the principal an educational leader? Does he devote considerable time to monitoring and improving the educational program?

These questions, answered affirmatively, indicate a professional staff that is giving serious attention to the needs of students interested in college. No substitute exists for an enthusiastic teacher, competent in a subject area, who shows a genuine interest in students. By example and by encouragement, the students of such teachers become enthused about learning.

Conclusion

SCHOOLS CAN MAKE A DIFFERENCE in the academic competence of students. Since the SAT measures some important dimensions of academic competence, then schools can also make a difference in SAT scores.

The 34 high schools with stable or rising SAT scores doubt that their scores are an accident of history. Rather, they are convinced that certain initiatives and programs and standards and attitudes are responsible for their success with the SAT. The benefit of their experience is open to secondary schools across the nation. Board members and parents and administrators and teachers may want to discuss the possibilities for their own students.

Appendix A

NASSP Survey
*High Schools with Stable or Rising SAT Scores**

Abilene High School
2800 N. 6th St.
Abilene, Tex. 79603
Phil Boone, Principal

Burgettstown Area Sr. High School
99 Main St.
Burgettstown, Pa. 15021
Raymond W. Lemaster, Jr., Principal

Cartersville High School
P. O. Box 309
Cartersville, Ga. 30120
Bill A. Dent, Principal

Charlotte Senior High School West
2219 Senior Dr.
Charlotte, N. C. 28216
John C. Fries, Principal

Chatham Township High School
255 Lafayette Ave.
Chatham, N. J. 07928
Joseph Della Badia, Principal

Conestoga Valley High School
2110 Horseshoe Rd.
Lancaster, Pa. 17601
James A. Kennedy, Principal

Detroit Country Day School
22305 West Thirteen Mile Rd.
Birmingham, Mich. 48010
Jerry Hansen, Asst. Headmaster

Edgemont High School
White Oak Lane
Scarsdale, N. Y. 10584
Joseph E. Doohan, Principal

Fairfield High School
205 E. Atlantic
Fairfield, Calif. 94533
Alton Sprague, Principal

Garfield Heights High School
12000 Maple Leaf Rd.
Garfield, Ohio 44125
Guy Stella, Principal

Hanford High School, East Campus
102 E. Grangeville
Hanford, Calif. 93230
Max B. Nichols, Principal

Johnston High School
345 Cherry Hill Road
Johnston, R. I. 02919
Pasquale J. Paolantonio, Principal

Lakeview High School
9800 Youngman Rd.
Lakeview, Mich. 48850
James Ford, Principal

Lexington High School
702 N. Lake Dr.
Lexington, S. C. 29072
Karl E. Fulmer, Principal

*Not all schools with stable SAT scores are included in the NASSP survey.

Littleton High School
199 E. Littleton Blvd.
Littleton, Colo. 80121
Melvin R. Harris, Principal

Lock Haven Senior High School
W. Church Street
Lock Haven, Pa. 17745
William A. Holland, Jr., Principal

Mamaroneck High School
107 Delancy Ave.
Mamaroneck, N. Y. 10543
Joseph T. Downey, Principal

Manchester High School
7401 Hull St. Rd.
Richmond, Va. 23235
Edward T. Jones, Principal

Marietta Senior High School
Davis Ave.
Marietta, Ohio 45750
Louis B. Bett, Principal

Mariner High School
200 120th St., S.W.
Everett, Wash. 98204
Donald Torrey, Principal

Stephen T. Mather High School
5835 N. Lincoln Ave.
Chicago, Ill. 60659
Marjorie S. Lerner, Principal

John McDonough High School
2426 Esplanade Ave.
New Orleans, La. 70119
Arman Green, Principal

Meadowbrook High School
4901 Coghill Rd.
Richmond, Va. 23234
Larry W. Buchanan, Principal

Newtown High School
Route 34
Sandy Hook, Conn. 06482
A. R. Cramer, Principal

Palo Alto High School
50 Embarcadero Rd.
Palo Alto, Calif. 94301
James E. Van, Principal

Oak Ridge High School
Providence Road
Oak Ridge, Tenn. 37830
Don L. Bordinger, Principal

William Penn High School
Basin Road
New Castle, Del. 19720
Jack D. Graybeal, Principal

Princeton High School
Moore St.
Princeton, N. J. 08540
George Petrillo, Principal

Rockville High School
Loveland Hill
Rockville, Conn. 06066
John F. Murphy, Acting Principal

Smithtown High School West
100 Central Road
Smithtown, N. Y. 11787
Alfred Mastrangelo, Principal

Ursuline Academy
5535 Pfeiffer Rd.
Cincinnati, Ohio 45242
Shirley G. Speaks, Principal

Vestal Central School
Vestal, N. Y. 13850
Norman Koslofsky, Principal

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Appendix B

NCTM-MAA
Position Statement
on

Recommendations for the Preparation of High School Students for College Mathematics Courses

The following statement, adopted by the Board of Governors of the Mathematical Association of America and the Board of Directors of the National Council of Teachers of Mathematics, is a brief outline of the basic ingredients of adequate preparation for collegiate-level mathematics.* The statement does not break new ground; it reflects standards that have been generally accepted for over a decade. It is intended to support the continuing efforts of conscientious teachers everywhere to provide students with sound and stimulating mathematical training. It is specifically designed to provide a benchmark for our efforts and those of others to assess and react to recent reports of a general decline in the performance of students in mathematics.

A joint committee of the Mathematical Association of America and the National Council of Teachers of Mathematics consulted with secondary school and college teachers in various parts of the country to study recent trends in the preparation of students. The comments from these consultations on which there was strongest consensus are the basis for this statement and its ten recommendations.

The Mathematical Association of America and the National Council of Teachers of Mathematics wish to emphasize that the statement and recommendations, as they refer to secondary school programs, are addressed only to those programs for students planning to go to college and that they are not intended to be more comprehensive. During the past twenty years many important changes have taken place in both the content and teaching of mathematics at the secondary school level. Many excellent new

*"*Collegiate mathematics* refers to courses in calculus (or calculus and analytic geometry), probability and statistics, finite mathematics, and higher-level mathematics courses.

programs have been adopted and taught effectively by teachers in elementary and secondary schools. Nevertheless, any consideration of the relative merits of new versus traditional school curricula has been deliberately avoided. A study of this issue would have exceeded both the charge to the committee and its limited resources. This statement and these recommendations incorporate many of the best features of both of these curricula and are addressed to all mathematics programs regardless of pedagogical heritage.

Necessary Course Work

Mathematics is a highly structured subject in which various concepts and techniques are greatly dependent on each other. The concepts of arithmetic and algebra, however, are basic to all of mathematics. Further work in mathematics and in all areas in which mathematics is used as a tool requires correct performance, with understanding, of basic arithmetic operations, the manipulation of algebraic symbols, and an understanding of what the manipulations mean.

Any student who is unable to perform arithmetic calculations and algebraic operations with accuracy and reasonable speed, to understand which operations to use in a given problem, and to determine whether the results have meaning is severely handicapped in the study and applications of mathematics. The prevalence of inexpensive pocket calculators makes the performance of complicated calculations less tedious, but the use of calculators does not lessen the need for students to understand which concepts and operations are needed to solve a problem, to make sensible estimates, and to analyze their results.

For further work in mathematics, and in many other areas from business to psychology, from biology to engineering, the ability to use algebra with skill and understanding is also essential. Having a passing grade in algebra is not enough. Both understanding and competence in the skills of algebra are necessary. Neither conceptual understanding nor technical skill alone will suffice in today's world, let alone in tomorrow's. Algebra is a useful subject which will help to solve problems in the real world. Opportunities to apply algebraic skills should be provided whenever possible, especially to problems that show the utility of mathematics.

Algebra courses in secondary school should include, in addition to the basic topics—

(a) polynomial functions;
(b) properties of logarithms;
(c) exponential and logarithmic functions and equations;
(d) arithmetic and geometric sequences and series;
(e) the binomial theorem;

(f) infinite geometric series;
(g) linear and quadratic inequalities.

For most students, adequate coverage of the topics in algebra requires at least two years of study.

Students who will take calculus—and this now includes many students who will take college work in business, premedicine, economics, biology, statistics, engineering, and physical science—may or may not need trigonometry, depending on the type of calculus course appropriate for their particular programs. But they will need a good deal of what is often called precalculus, including especially a sound understanding of the concept of a function, which is also fundamental for work beyond the most elementary level in probability and computing.

Those students needing trigonometry should study—

(a) trigonometric functions and their graphs;
(b) degree and radian measure;
(c) trigonometric identities and equations;
(d) inverse trigonometric functions and their graphs.

For such students, the equivalent of one semester should be devoted to the study of the topics in trigonometry.

All students who go on to take collegiate mathematics will find their college work easier if they have been introduced to some axiomatic system and to deductive reasoning. Traditionally this has been accomplished in a geometry course. Geometry courses in secondary school should include, in addition to basic topics—

(a) fundamental properties of geometric figures in three dimensions;
(b) applications of formulas for areas and volumes;
(c) experience in visualizing three-dimensional figures.

Other courses (the word *course* refers here and elsewhere in this statement to a semester course unless otherwise noted) beyond algebra, trigonometry, and geometry should be available to students who have adequate background and time to take them. A course in coordinate (or analytic) geometry is ideal, since it combines algebra with geometry and provides a useful preparation for calculus. In addition to coordinate geometry, courses in the following topics are valuable: probability, statistics, elementary finite mathematics (or linear algebra), an introduction to computers and computing, and applications of mathematics.

If coordinate geometry is offered, it should include, in addition to the basic topics—

(a) conic sections;
(b) rational functions and their graphs;

(c) polar coordinates;
(d) parametric equations and their graphs.

Inductive as well as deductive reasoning, techniques of estimation and approximation, and an awareness of problem-solving techniques, with special emphasis on the transition from the verbal form to the language of mathematics, should be emphasized in all courses.

Calculus, where offered in secondary schools, should be at least a *full year* course and be taken only by those students who are strongly prepared in algebra, geometry, trigonometry, and coordinate geometry.

We recognize that many secondary schools have a curriculum similar to that outlined above. We emphasize again that, in order to be properly prepared for collegiate-level courses in mathematics, students need to develop skills (1) in applying standard techniques and (2) in understanding important concepts.

Recommendations

The Board of Governors of the Mathematical Association of America and the Board of Directors of the National Council of Teachers of Mathematics make the following recommendations:

1. Proficiency in mathematics cannot be acquired without individual practice. We therefore endorse the common practice of making regular assignments to be completed outside of class. We recommend that parents encourage their children to set aside sufficient time each day to complete these assignments and that parents actively support the request of the teacher that homework be turned in. Students should be encouraged to develop good study habits in mathematics courses at all levels and should develop the ability to read mathematics.

2. Homework and drill are very important pedagogical tools used to help the student gain understanding as well as proficiency in the skills of arithmetic and algebra, but students should not be burdened with excessive or meaningless drill. We therefore recommend that teachers and authors of textbooks step up their search for interesting problems that provide the opportunity to apply these skills. We realize that this is a difficult task, but we believe that providing problems that reinforce manipulative skills should have high priority, especially those that show that mathematics helps solve problems in the real world.

3. We are aware that teachers must struggle to maintain standards of performance in courses at all levels from kindergarten through college and that serious grade inflation has been observed. An apparently growing trend to reward effort or attendance rather than achievement

has been making it increasingly difficult for mathematics teachers to maintain standards. We recommend that mathematics departments review evaluation procedures to ensure that grades reflect student achievement. Further, we urge administrators to support teachers in this endeavor.

4. In light of recommendation 3, we also recognize that the advancement of students without appropriate achievement has a detrimental effect on the individual student and on the entire class. We therefore recommend that school districts make special provisions to assist students when deficiencies are *first* noted.

5. We recommend that cumulative evaluations be given throughout each course, as well as at its completion, to *all* students. We believe that the absence of cumulative evaluation promotes short-term learning. We strongly oppose the practice of exempting students from evaluations.

6. We recommend that computers and minicalculators be used in imaginative ways to reinforce learning and to motivate the student as proficiency in mathematics is gained. Calculators should be used to supplement rather than to supplant the study of necessary computational skills.

7. We recommend that colleges and universities administer placement examinations in mathematics prior to final registration to aid students in selecting appropriate college courses.

8. We encourage the continuation or initiation of joint meetings of college and secondary school mathematics instructors and counselors in order to improve communication concerning mathematics prerequisites for careers, the preparation of students for collegiate mathematics courses, joint curriculum coordination, remedial programs in schools and colleges, the exchange of successful instructional strategies, the planning of in-service programs, and other related topics.

9. Schools should frequently review their mathematics curriculum to see that it meets the needs of its students in preparing them for college mathematics. School districts that have not conducted a curriculum analysis recently should do so now, primarily to identify topics in the curriculum that could be either omitted or deemphasized, if necessary, in order to provide sufficient time for the topics included in this statement. We suggest, for example, that the following could be deemphasized or omitted from the curriculum:

   (a) Logarithmic calculations that can better be handled by calculators or computers

(b) The extensive solving of triangles in trigonometry

(c) Proofs of superfluous or trivial theorems in geometry

10. We recommend that algebraic concepts and skills be incorporated wherever possible into geometry and other courses beyond algebra to help students retain these concepts and skills.

This position was prepared jointly by the National Council of Teachers of Mathematics, 1906 Association Dr., Reston, Va. 22091, and the Mathematical Association of America, 1225 Connecticut Ave., N.W., Washington, D.C. 20036.